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Method and Apparatus for Mixing Fluids Hagen et al.
Atty Docket:VAST.001CP2

Fig. 18

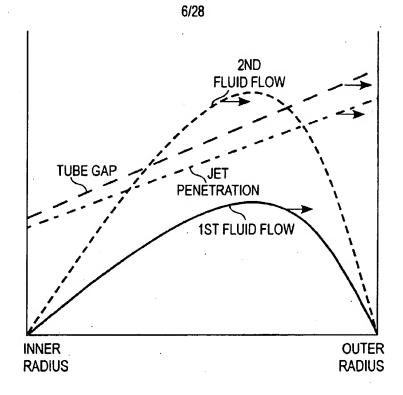


Fig. 19

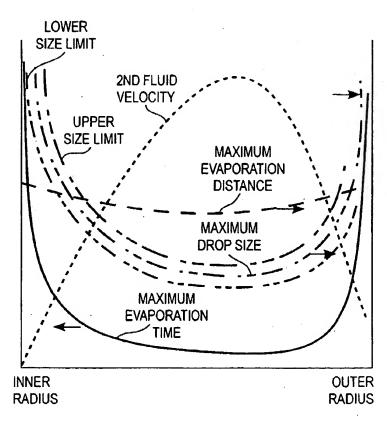
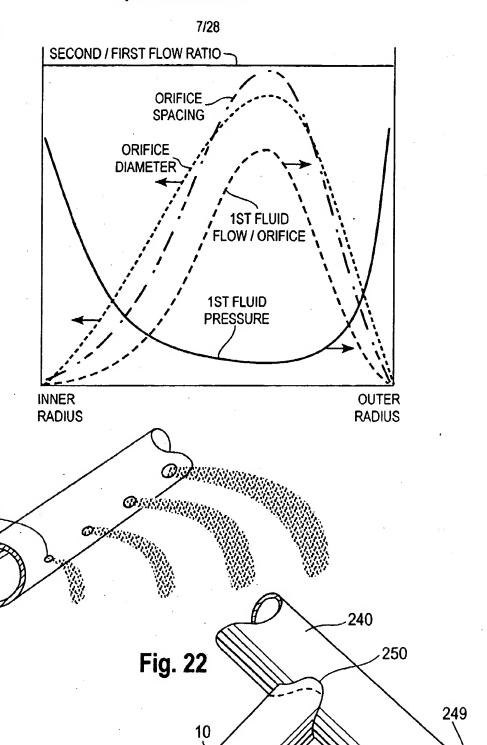
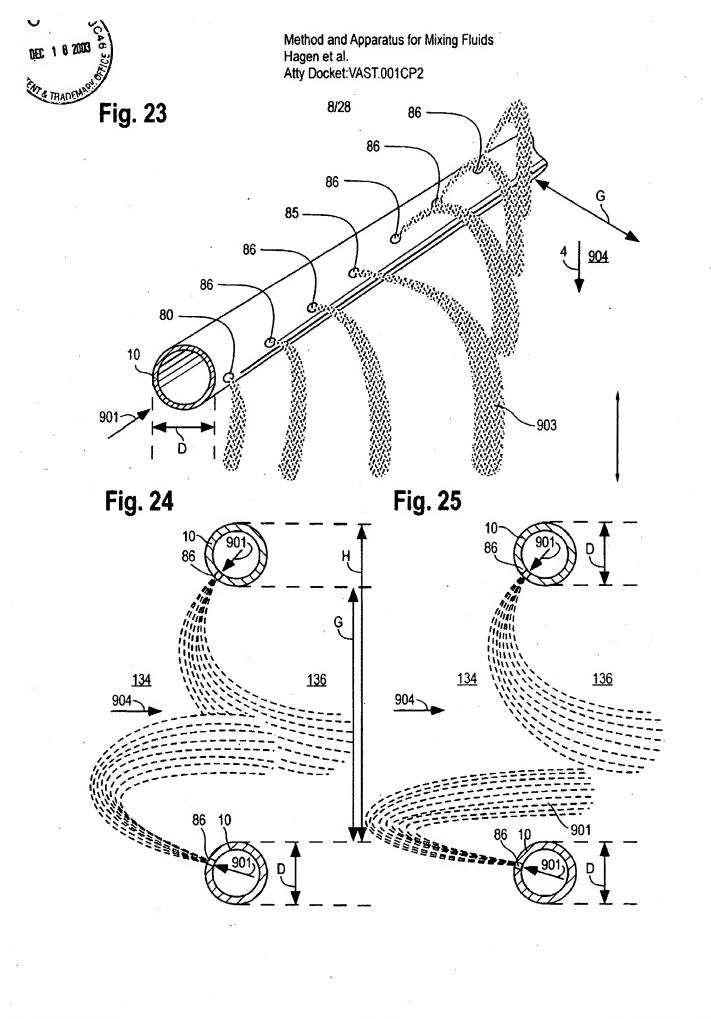


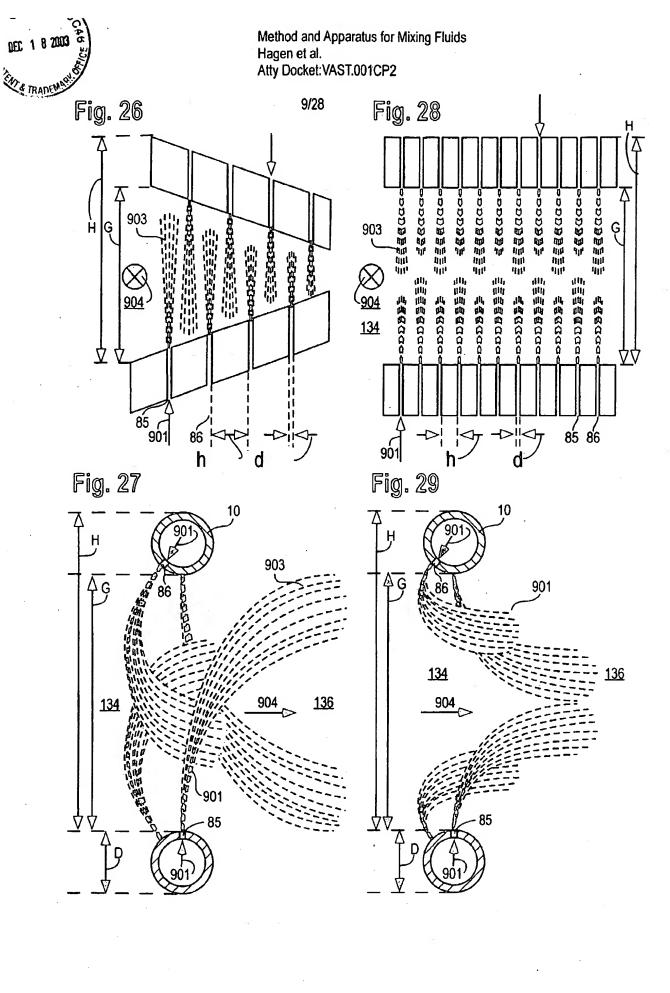


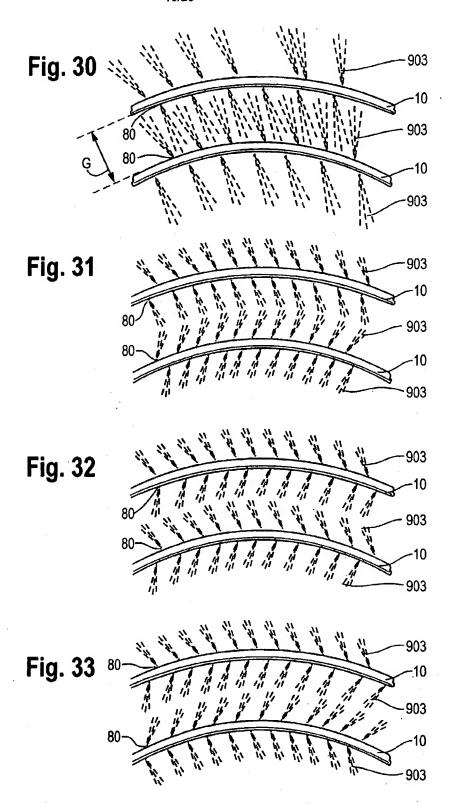


Fig. 21

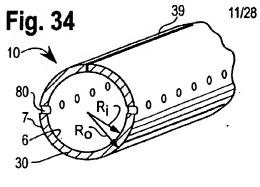


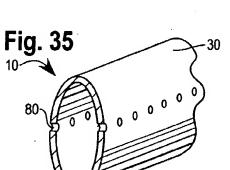


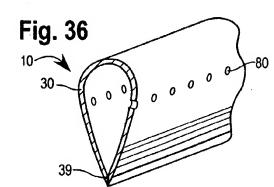


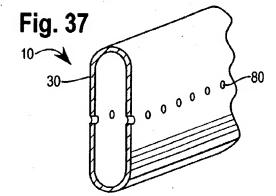


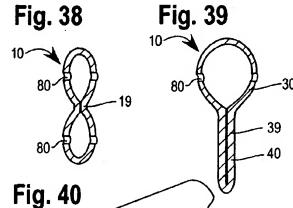


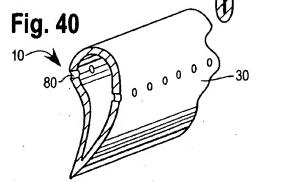


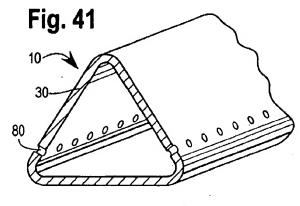


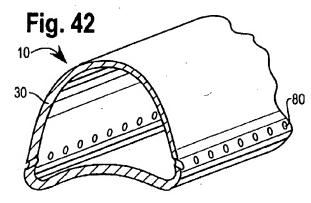


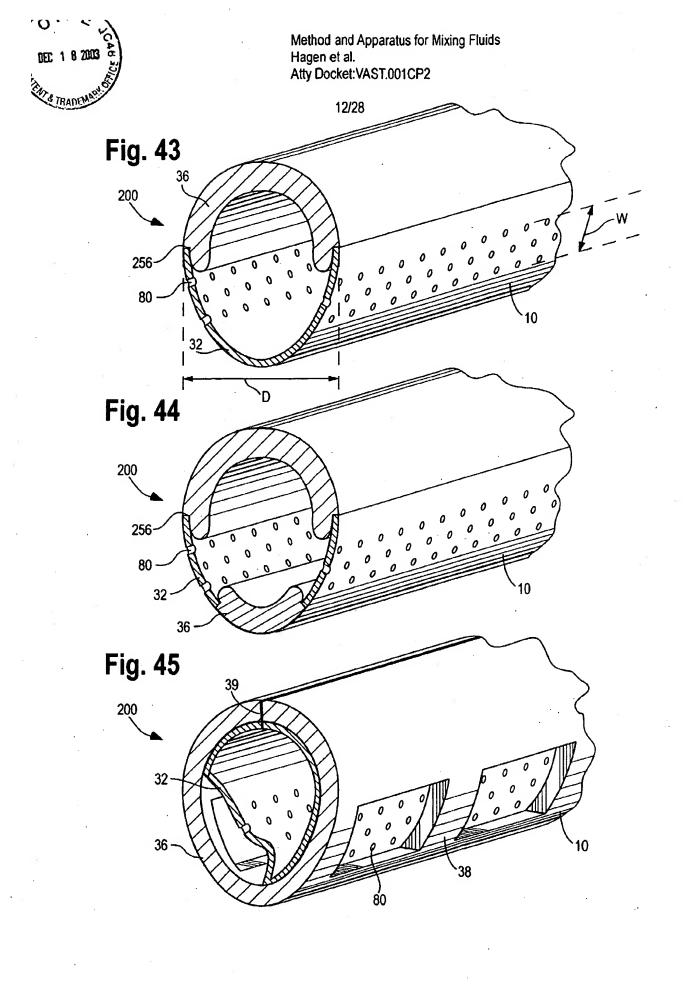












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Fig. 47

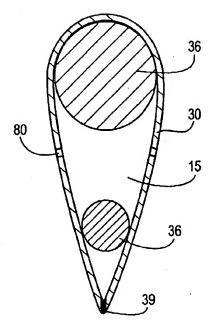
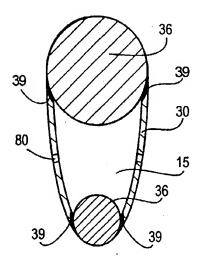
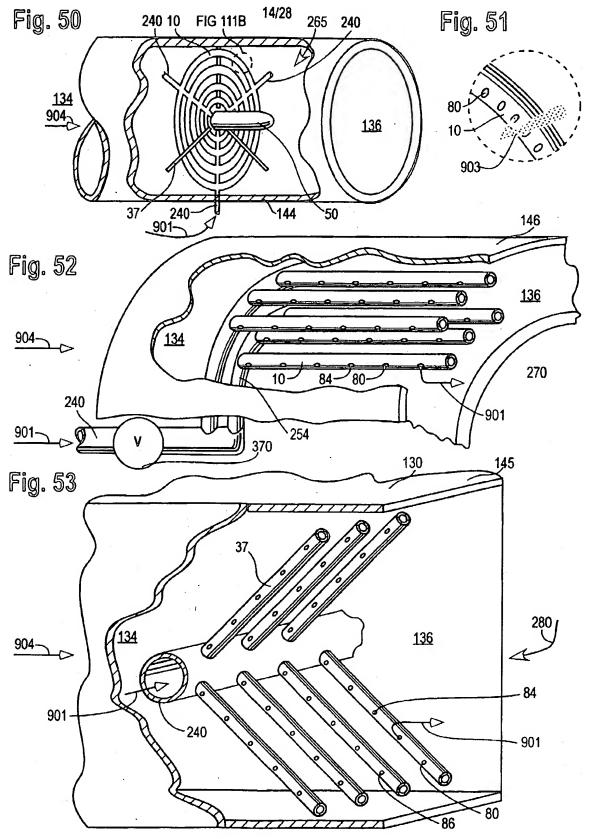
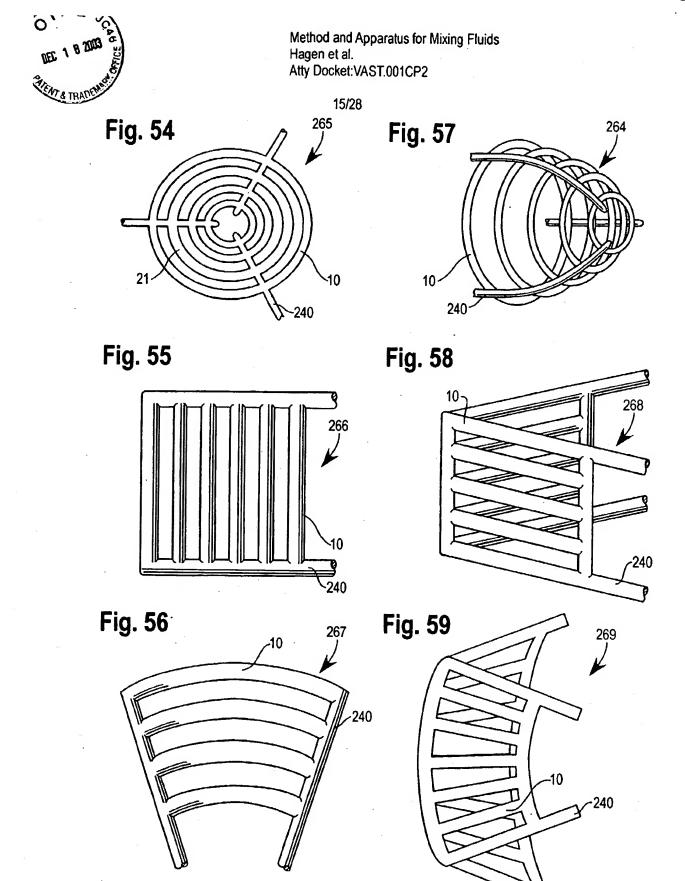


Fig. 49







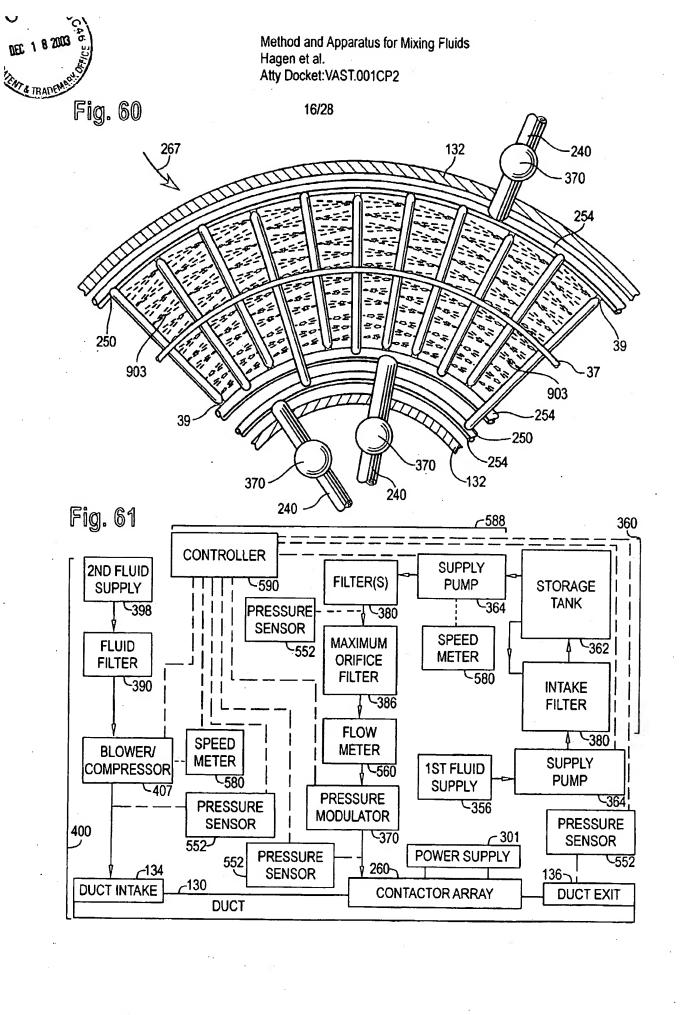
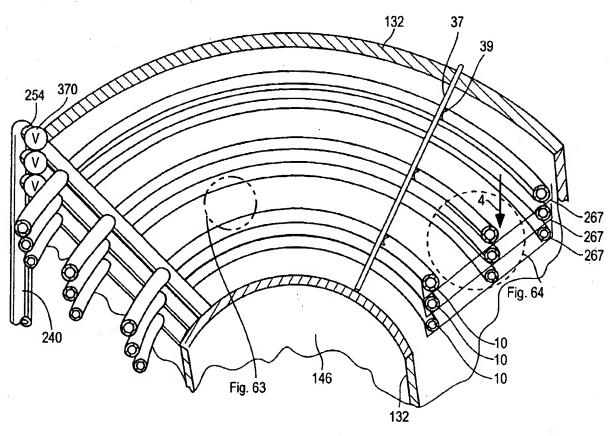
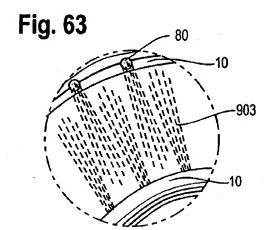
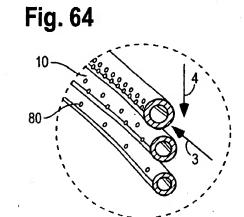


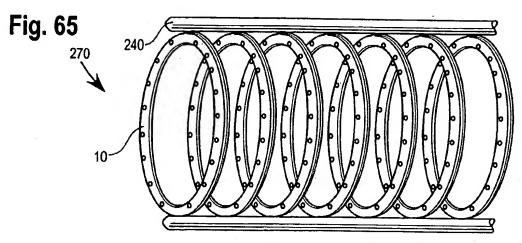


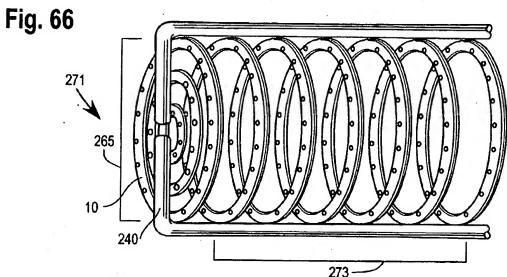
Fig. 62

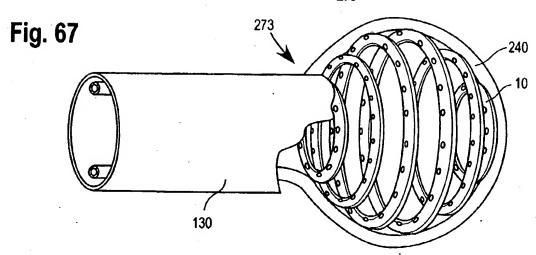




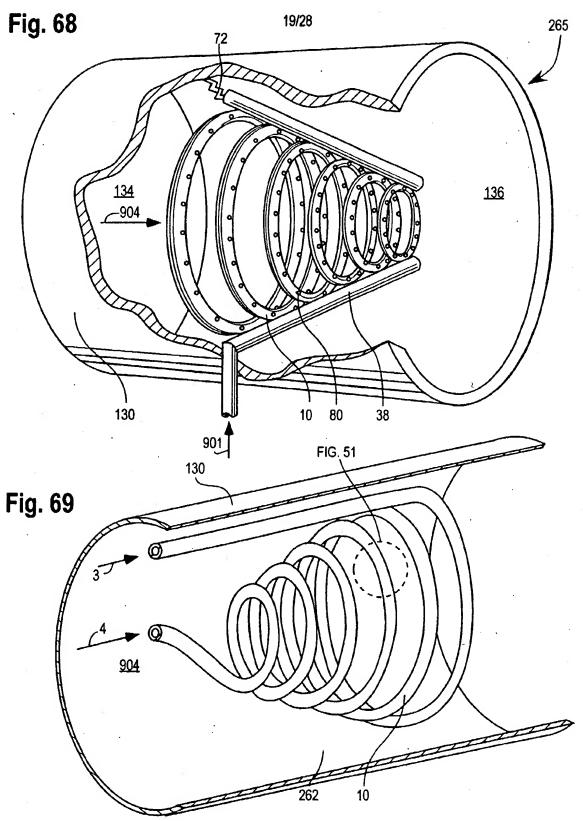




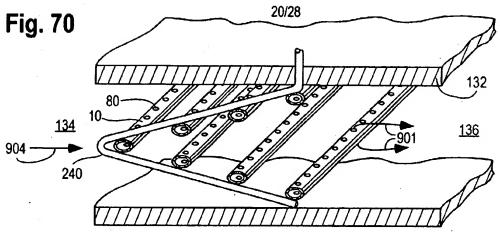


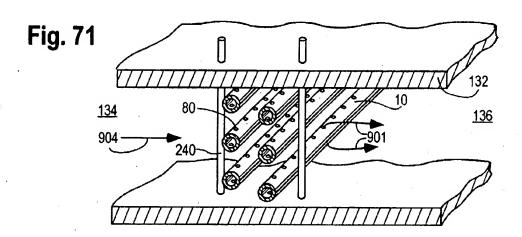


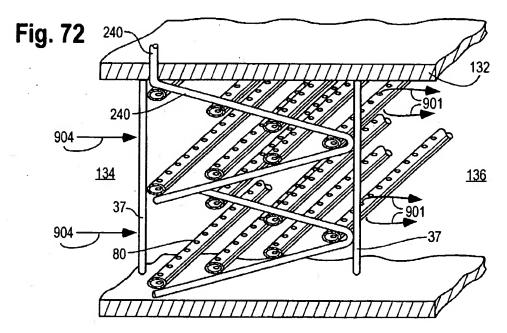












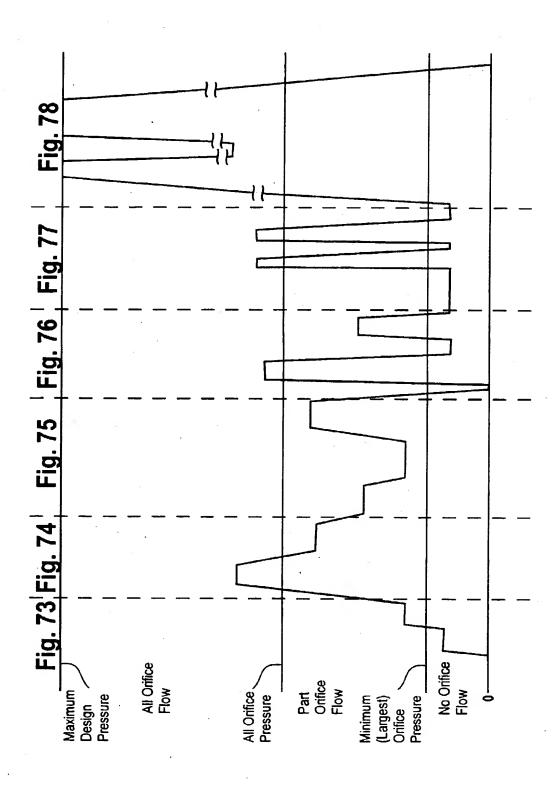




Fig. 79

134

904

302

322

10

316

304

326

132

Fig. 80

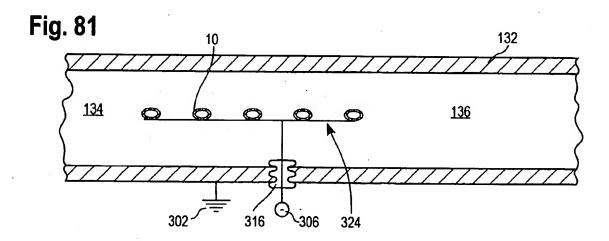
134

904

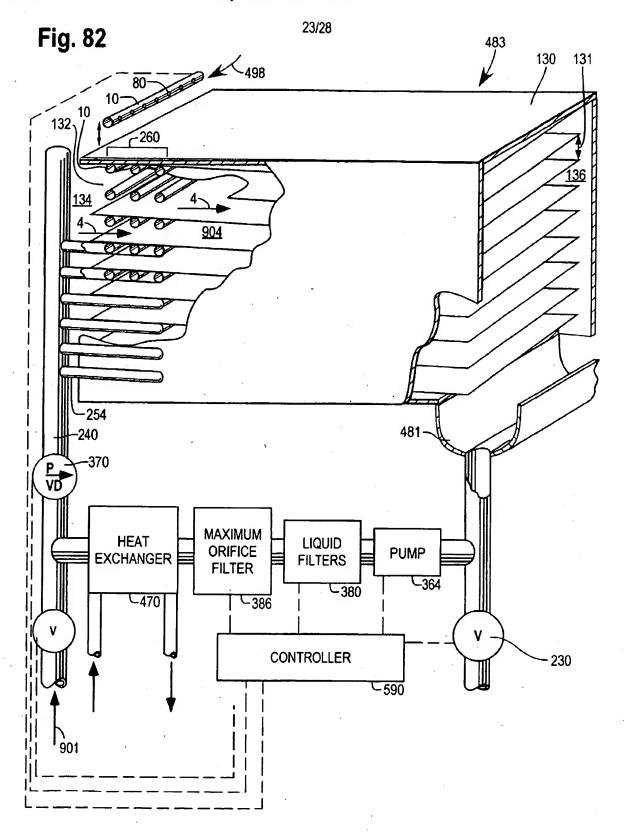
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306

302 322







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Fig. 83

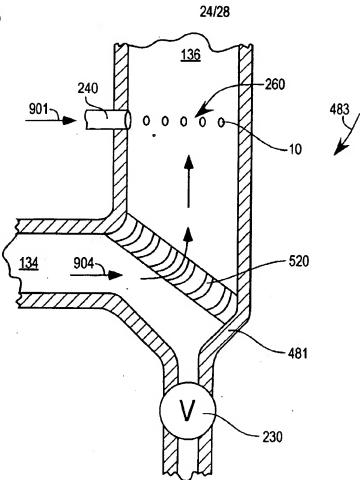
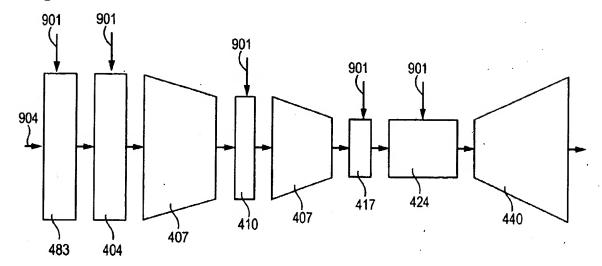
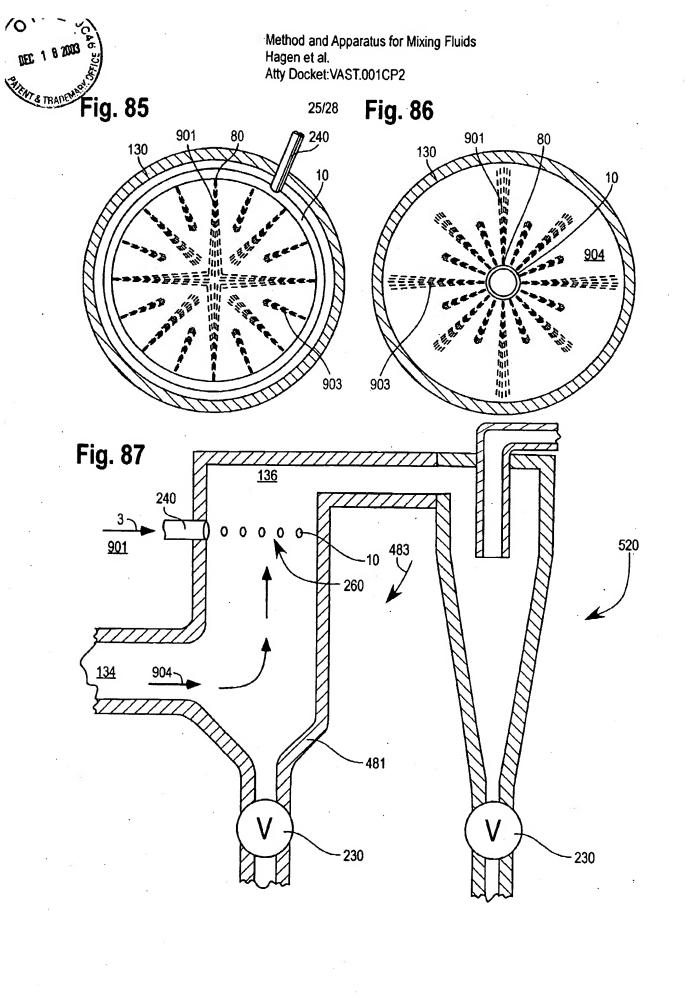
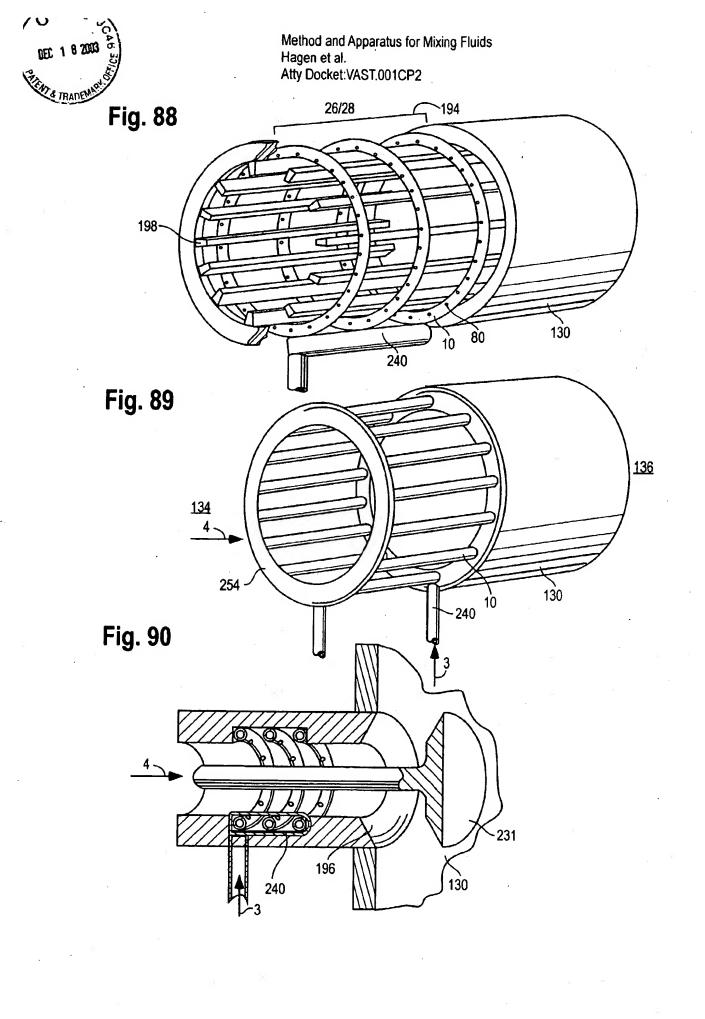


Fig. 84







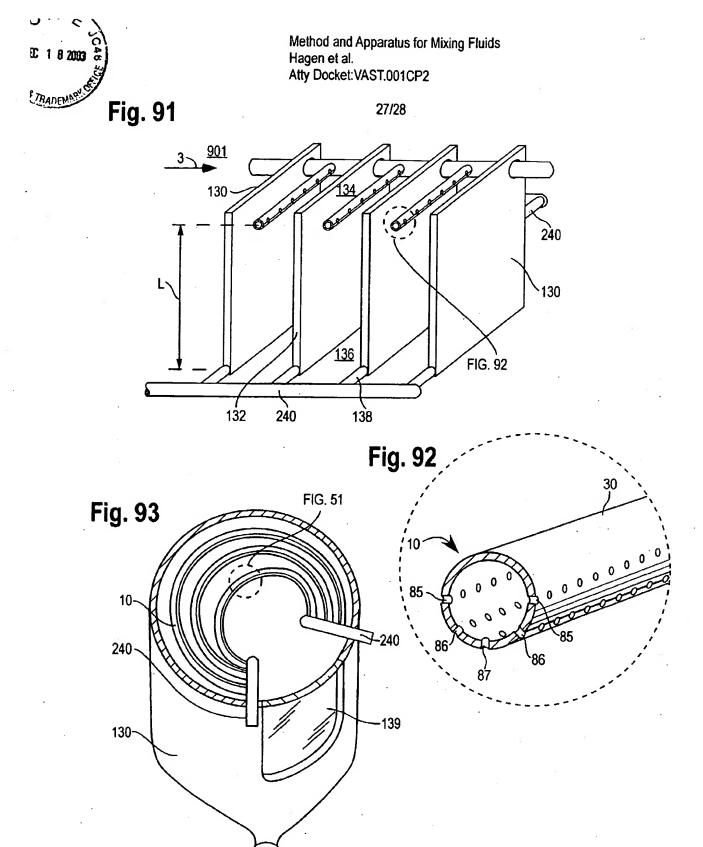




Fig. 94

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INITIATE DISTRIBUTED CONTACTOR MODELING METHOD

SET BOUNDARY CONDITIONS

FIRST & SECOND FLUID MASS FLOW RATES, DENSITIES, VELOCITIES, PRESSURES

INITIALIZE PARAMETERS

PRESSURE, CONE ANGLE, ORIFICE NUMBER, ORIFICE SPACING, ORIFICE DIAMETER, PENETRATION, TUBE GAP, WALL THICKNESS, TUBE DIAMETER, INJECTION VELOCITY, TUBE LENGTH

SOLVE SIMULTANEOUS EQUATIONS

DESIGN EQUATIONS

HOLE SPACING, TUBE LENGTH, TUBE SPACING TUBE TENSILE STRENGTHS & BURST PRESSURES

FLOW & THERMOCHEMICAL EQUATIONS
ORIFICE FLOW MODEL THERMOCHEMISTRY
SPRAY PENETRATION CORRELATION
CONE ANGLE CORRELATION
COMPOSITION MASS FLOW RATE RELATIONS

APPLY CONSTRAINTS e.g.
TRANSVERSE DISTRIBUTION(S) OF SPRAY PENETRATION,
SECOND TO FIRST FLUID COMPOSITION
HEAT TRANSFER TIME & DISTANCE AND/OR
EVAPORATION TIME & DISTANCE
TUBE MAXIMUM PRESSURE, TUBE DIAMETER
MAXIMUM ORIFICE LENGTH/DIAMETER

OUTPUT VALUES

TRANSVERSE DISTRIBUTION(S) OF FLUID PRESSURE,
ORIFICE NUMBER, ORIFICE SPACING, ORIFICE DIAMETER,
ORIFICE ORIENTATION, ORIFICE LENGTH/DIAMETER,
SPRAY CONE ANGLE, SPRAY PENETRATION, INJECTION VELOCITY,
TUBE GAP & TUBE WALL THICKNESS; & TUBE DIAMETER & TUBE LENGTH